University of Virginia Replacement Hospital Program:

A historic project for a historic university

In 1977 a medical faculty committee at the University of Virginia completed a study recommending improvements to the medical center's intensive and acute care facilities. That recommendation evolved into the largest state hospital construction program in the history of Virginia.

Dr. William H. Mueller, Jr., vice president for health affairs at the University of Virginia, located in Charlottesville, spearheaded the effort to make the new facilities a reality. When the Virginia General Assembly approved funding in the spring of 1984, the next issue to address was the construction approach.

Dr. Charles Hamner, associate vice president for health affairs and project director, strongly advocated hiring a construction management firm rather than a general contractor because the construction manager could put the project on a fast-track schedule. Fast-track construction management overlaps the design and construction phases instead of waiting for completion of all working drawings to begin construction.

The joint venture team of CRSS Constructors and Barton Malow Co. was chosen to manage construction. Hiring these companies early in the project allowed them to positively influence constructibility, phasing logistics, labor force requirements and overall project bidding strategy. According to Dr. Hamner, the result was that the projects were pulled together under the direction of a single team, instead of pulling apart under the direction of several contractors.

Construction began on June 1, 1985, eight years after the inception of the project study. CRSS Constructors, the Denver-based construction management division of CRS Sirrine, Inc. (CRSS), and Barton Malow, the Detroit-based construction firm, had just completed a joint venture project on a similar tertiary care teaching hospital for the University of Michigan. Six members of that project team joined the Virginia team, bringing a combination of experience, tested techniques and a "no surprises" approach to the 35-person University of Virginia CM team. The first order of business was a series of work sessions with university and city officials to identify where, when and how construction would affect the community, and to mitigate the disruption.

The 21-acre project site is adjacent to the existing Medical Center campus. New buildings under construction are a 632,000 S.F. replacement hospital, a 65,000 S.F. medical research building, a 10,000 S.F. chiller plant and a 647-car garage. The focus of the $200 million project is the replacement hospital. The 402-bed hospital will provide more efficient treatment of patients and increase the availability of specialized services. The eight-level hospital contains four levels of inpatient beds and can facilitate both vertical (two additional levels) and horizontal expansion.

According to others close to the project, the CM approach is vital. Robert Grottenthaler, one of three contracts managers on the replacement hospital project, explains that the team has roughly 30 months to complete all the interior work on this portion of the building program, a rigorous schedule for a hospital of this size.

One way to meet that schedule is to dedicate a site trailer solely to the coordination of drawings by the different trade contractors. The trailer is manned by full-time representatives of the trade contractors, and weekly coordination meetings, usually involving the owner and engineer, are held to answer any questions and iron out problems.

"The weekly coordination meeting really pulls everybody together," Grottenthaler says.

Although the 3,000 S.F. trailer has been an expensive investment, it has more than paid for itself with added efficiency. Grottehthaler explains that the coordinated efforts minimize revisions to field work, resulting in both time and cost savings. When there is no onsite coordination of drawings, the trade contractors do the work in their offices. As the drawings are passed from contractor to contractor, problems often arise to hinder progress. For example, not all trade contractors draw their plans to the same scale, and the time lag caused by the mail slows the process. Onsite coordination eliminates both of these problems.

Another successful time-saving strategy involves fire safety. When a project is complete it must be inspected by the state fire marshal, Grottenthaler explains. If the fire marshal does not approve the building, time consuming, costly and frustrating delays can result . To avoid this possibility, Barton Malow/CRSS involved the fire marshal early in the project.

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This kind of effective management is the key to the project's success, according to Ron Rasmussen, another contracts manager for the replacement hospital.

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The replacement hospital includes some of the latest medical technology. For example, two Magnetic Resonance Imaging machines will be housed in a two-story extension of the replacement hospital near the emergency entrance.

CRSS Constructors at a glance

CRSS Constructors, Inc. is the Denver-based construction management division of CRSS (NYSE:DA), located in Houston. CRSS provides comprehensive services in architecture, engineering, construction, design and program management. The company also initiates, develops, finances and participates in the ownership of projects in the power and cogeneration industry.

CRSS Constructors offers the full range of construction management services. A pioneer of fast-track construction techniques, the company prides itself on successful completion of projects on time and budget. The company has a long list of satisfied clients, and much of its work comes from repeat customers.

Recent CRSS Constructors healthcare projects include:

- University of Michigan Adult General Hospital and Ambulatory Care Facility, Ann Arbor, Mich.
- Manhattan Psychiatric Center, New York, N.Y.
- Children's Nutritional Research Center, Houston, Texas
- Shands Hospital at the University of Florida, Gainesville, Fla.
- Veterans Administration Hospital, Denver, Colo.
- University of Texas Biomedical Research Center, Dallas, Texas
- California State Hospitals Improvement Program, 10 locations throughout the state
- Dallas/Fort Worth Medical Center, Dallas, Texas
- National Institute of Health, Bethesda, Md.
- South Florida Treatment and Evaluation Center, Miami, Fla.

For more information about CRSS Constructors' services to hospitals and other medical institutions, contact Robert B. Salmon, national healthcare marketing coordinator, (303) 820-5200.

The building will contain rooms for the machines, dressing rooms and a control room. The replacement hospital will be connected to the existing multistory hospital by an enclosed, elevated link with intermediate stops at the Primary Care Center and Jordan Hall. One level of the 680-foot link will be used for patients and equipment transport, while the other level will serve visitors and staff. The two-story link, which crosses a major thoroughfare, is also expandable.

Within the link, but invisible to the public's eye, are two material distribution systems. A pneumatic tube system and an automated material distribution system, or AMDS, serve the replacement hospital and cross the link to serve the existing hospital. The AMDS runs on an electric track throughout the ceilings. In the replacement hospital it connects the stat lab to the operating rooms, and vertically connects all nurses' stations.

The replacement hospital also is linked to the new parking structure via a covered walkway. The five-story garage can be expanded to six stories, and houses the replacement hospital's emergency generator. The garage was completed on time and within budget, and delivered to the university June 2, 1986.

The existing hospital is scheduled to undergo a major facelift, affecting over 400,000 S.F. of space. Renovations will begin after the replacement hospital is complete in September 1988, and plans include upgrading certain specialty units and increasing the number of operating rooms from 14 to 20. Renovations are to be complete by the fall of 1990.

The medical research (MR-4) building addition was not part of the original project plan, but it will be completed within the same time frame as the rest of the project. Construction began on this four-story building in September 1986, and completion is scheduled for May of 1988, 21 months later.

The MR-4 addition is a separate research building adjacent to the existing research building. This building, too, can be expanded — to six levels. It houses a complete vivarium on the lower level, a clinical radiological research center on the ground floor and medical research laboratories on the two upper floors. Noteworthy features include specialized air circulation systems and vivarium walls angled at the base to facilitate wash down. The addition connects to the existing MR-4 building on all levels and a central entrance will serve both buildings. The laboratory spaces have a modular design that allows different departments within the School of Medicine to use the same laboratories.

Robert Rayborn, project manager for the research building, describes it as "a functional, straightforward and strong building." One of his greatest challenges results from having such an enormous project as a neighbor. There are about 15 different trade contractors on the MR-4 project, with the largest contract less than $1 million. In contrast, the replacement hospital's largest trade contract is almost $15 million. Rayborn explains that most of the major trade contractors were already working on the replacement hospital and they had a difficult time finding competitive bids for the MR-4 project. Despite that problem, competitive bids were obtained and the building is being delivered within budget.

One side benefit of working on larger projects such as this, according to Rayborn, is they attract expertise and build friendships.

His sentiments are shared by most people working on the project. When asked how well Barton Malow and CRSS work together, Grottenthaler says: "It is hard to tell one person from one company or another anymore, it's just amazing. We are just one family."

"Nobody differentiates a Barton Malow person from a CRSS person. Communication has been very good on our team," agrees John Thames, project administrator.

Dr. Hamner of UVA also relies on the team effort, from a broader scope. "I draw from my team members, which include not only the A/E and my project management staff, but also from my CM. The project is a team effort with team results," he says.

The good results speak for themselves, and the new power plant project is no exception. To accommodate the newly expanded medical center, the existing power facilities have been upgraded and expanded within a strictly confined area near the center's main entrance. A 12.5 kilovolt electrical substation has been built to serve the central power plant,

replacement hospital and existing hospital. The new central chiller plant houses three 1,200-ton chiller units, and is expandable to accommodate five additional units.

Renovations to the existing heating plant, which currently houses three coal-fired boiler units and one gas-fired unit, include the relocation of a 90,000 pounds-per-hour (pph) gas/oil fired boiler, the addition of a new 90,000 pph gas/coal fired boiler, and the installation of a dense-phased coal handling system. The work includes a new baghouse, a new ash handling system and four 90-foot x 30-foot concrete coal storage silos, each with a capacity of 1,000 tons. The area also includes a rail-accessed coal unloading facility that can handle four 100-ton railcars simultaneously.

Once the first phase of the coal handling system, including the new silos, was in place, the project team had to remove the existing coal storage "facility" — a 10,000-ton pile of coal behind the heating plant. Some was burned and some was stored in the new silos. After the pile was removed, specific construction phasing, a "domino effect" affecting each trade contractor working in this area, occurred. Five CM staff members coordinate this process for the central heating/chiller plant, keeping the contractors on schedule to meet the December 1987 completion date.

It takes a dedicated team to mesh diverse construction projects, meet fast-track deadlines and stay within budget constraints. The CM team is drawing upon all of its experience and expertise to create a new generation of facilities that will serve tomorrow's needs as well as the university served yesterday's needs when Thomas Jefferson laid out the original plans.

The University of Virginia Medical Center has always been an important resource to the southeastern United States, serving people throughout Virginia and parts of West Virginia. The center, fully operational during construction and renovation, has not compromised its commitment to quality care during this period of frenetic activity. When the last coat of new paint dries in 1990, the University of Virginia Medical Center will more than ever be one of the finest facilities in the healthcare industry.

This article was written by Richard Allely, CRSS Constructors project manager, central heating/chiller plant, University of Virginia Medical Center and Maria Verduzco, CRSS Constructor's communications assistant. Additional material was supplied by Robert Grottenthaler and Ron Rasmussen, both of whom are CRSS Contructors contracts managers working on the replacement hospital.

Six keys to successful projects

Time, cost and quality are three challenges facing any construction project. The University of Virginia Replacement Hospital Program poses an additional challenge — keeping the medical center open and operational during construction.

Larry Navin, CRSS project director at the university, outlines six reasons why the CRSS construction management team has been able to deliver a quality project while hospital operations continue unabated.

1. **Quality people:** "We've got motivated, talented, competent people working on the project," Navin says. "We've got a high esprit de corps within the team, and the strengths and weaknesses within our people complement each other."

2. **Operating procedures:** Talented people can't deliver a high-quality project without solid operating procedures, according to Navin. The well-defined set of procedures and disciplined routine established by the CRSS team is critical to the success of the project, he says. Reports are monitored constantly for early warning signals of potential problems and the comprehensive tracking system covers "almost everything so nothing can fall through the cracks," he adds.

The procedures allow staff members to be more efficient and independent. They don't have to ask their supervisor how to approach each new obstacle. "Our procedures allow the staff to run more efficiently because we don't have to constantly re-create the wheel," Navin explains.

3. **Structure and responsibility:** The structure of the CRSS team and the delegation of responsibility gives each person a sense of ownership and pride in their work. Each team member's responsibility and territory is clearly defined, an additional incentive to deliver a quality project.

"They are proud of what they are doing because of that sense of ownership," Navin says.

4. **Squatters sessions:** When the CRSS team first arrived in Charlottesville in January 1985, they held a series of "squatters" sessions with university and city officials to explain how the project would affect community activities. When university and city officials went into the meeting, they knew what the finished project would look like but they didn't know how the construction would affect them in the interim, Navin recalls.

"The sessions flushed out a lot of potential problems," he says. The sessions also established effective communications between the CM team, the university and the city.

5. **Coordinated drawings:** The replacement hospital's coordinated drawing trailer was a key reason why the CRSS team was able to meet the demanding schedule for the completion of the hospital interior. Navin attributes much of the success of this portion of the job to Robert Grottenthaler, contracts manager.

6. **Executive management support:** The University of Virginia Replacement Hospital Program and related work is highly visible because it is the largest building project in the state's history. Because of the project's scope, the CM team has drawn upon all available corporate expertise.